Review of effective teaching approaches in primary schools – Overview, conclusions and implications

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1. Introduction

This is a summary report of a larger scoping review conducted by the same authors. It addresses the following question, and sub-questions:

- What are currently the most effective approaches for teaching primary school children?

And, as far as it is possible to tell:

  - Do the effective approaches differ for different sub-groups of pupils, and if so, how?
  - Do the effective approaches differ for particular ages or phases within education to age 11?

The report does so by summarising and synthesising a wide range of relevant international research reports and evidence. The research questions are causal in nature and so the review only considers evidence that is potentially capable of addressing this causal question – most notably this includes randomised controlled trials and similar. Each study included is assessed in terms of quality (how trustworthy the results are judged to be) and its outcomes (whether it works and how effective it is), and the most promising approaches are described in more detail. This overview summarises the evidence in each over-lapping area through use of a summary table. The columns in each table show whether the approach is deemed effective and beneficial or ineffective and/or possibly harmful. The rows given an indication of the quality of each study – ranging from higher quality meaning that the study is about as good as could be expected in real-life, to lower quality meaning that the study is not to be trusted on its own as evidence that an approach works. A lot of further 'research' on the relevant topics has simply been ignored because it is not capable of uncovering causal influences. The lower quality work in the tables has been retained because it was capable of providing useful evidence – but was perhaps too small in scale, had very high numbers of missing cases, or unreliable measurements.

It is important to distinguish between approaches that do not work in terms of raising attainment, those that have either not been tested or have mixed or unclear results, and those that have evidence of beneficial impact. The focus here is more on the latter, although the first two groups are also summarised briefly. The importance of knowing about approaches that are not evidence-informed is that they may be widespread and so harming individuals' lives either directly or at best by not permitting better approaches to use the same time and resources.

2. Summary of the findings

The full report notes a small number of specific interventions that *have* been trialled with success – such as "My Reading Coach" and "Grammar for Writing". Other than these, and where work has been replicated in some way so that the results are more secure, the following are probably worth pursuing:

- **A range of literacy interventions including phonics and similar approaches, with programmes like Reading Recovery and Accelerated Reader, all giving an 'effect' size of 0.2 or more**
- **Tiered individual and small group programmes, including Response to Intervention, all giving an 'effect' size of 0.2 or more**

However, all of these are mostly tested and successful with pupils struggling with literacy or maths. Few have been shown to be successful with mixed ability whole classes.

On the other hand, **appropriate and targeted work for small groups in heterogeneous classes has an 'effect' size of around 0.1**. All of the above provide a role for TAs. They also provide disguised examples of teachers using research evidence in practice – disguised because the evidence is built into the protocol.

Although these interventions can be used at almost any primary age when a problem surfaces, other studies in the main report suggest that early-years interventions are most effective. Early literacy is important to allow pupils to access the wider curriculum. However, there is barely enough good evidence overall. It is hard to find solid evidence about the differential age effectiveness of different pedagogical approaches (i.e. studies that compare the impact of an approach for different age groups).

For whole classes, the evidence is that the following are probably worth pursuing:

- Greater pupil autonomy such as occurs in circle discussion time, and teaching reasoning skills, giving an 'effect' size of around 0.2.
- Maths Mastery, giving an 'effect' size of around 0.1.

There is not enough evidence on interventions related to mindfulness, focusing on developing pupil content knowledge, teacher content knowledge, explicit teaching, pupil:teacher interactions and raising teacher expectations. However, many of these are not looking promising.

There is considerable evidence on peer-tutoring, collaborative learning, quizzes and practice, self-regulation and enhancing formative feedback. Unfortunately, the evidence is mixed and therefore unclear. These approaches have not been found to be harmful and are relatively inexpensive.

The following are probably not worth pursuing if the aim is solely to improve attainment – grade retention, setting and streaming, improving attitudes, aspirations or motivation alone, teacher's direct use of evidence (as opposed to teachers using evidence based protocols, approaches or resources), participation in arts, drama or music for improvement in other subjects, behavioural interventions, and the generic use of ICT/CAL in the classroom. It follows then that these issues should not be promoted in literature, courses, resources or initial training for primary teachers. The full report also notes a range of specific interventions that have been trialled without success. Given the number and range of possible interventions, unsuccessful ones should be avoided.

3. Approaches currently deemed effective

Beginning with the important areas where there is good or at least promising evidence of effectiveness, this section considers approaches for individuals and small groups before turning to whole class issues.

3.1 Individual/small group approaches

Phonics

Unlike the kinds of literacy interventions described above, there is a wide range of specific interventions and protocols that have been used successfully with small groups or even individual pupils to help overcome problems in literacy (and to a lesser extent maths). The evidence for teaching via phonics approaches is not as strong as some commentators envisage but suggests that the approach is successful - at least for struggling readers (Table 1). The scoping review discusses 18 evaluations, as well as the results of a number of prior reviews. On balance it appears that **phonics does work for young children who are not readers from an early age.** This is not proposed as a whole class intervention, and the evidence base is largely about individual or small group teaching. The direct cost is minimal but the approach does mean having another trained staff member for each class so that work is in parallel (this scoping review does not address extra classes or outside school activities).

Table 1 - Quality and impact summary: studies of phonics/phonological approaches

	Effective	Ineffective/unknown
Higher quality	1	0
Medium quality	1	1
Lower quality	12	3

Reading Recovery

There is slightly more secure evidence for **Reading Recovery/Switch-on, which has about the same impact as phonics interventions for the sub-set of pupils who are struggling to read** (Table 2). The scoping review presents eight trials, of which most are positive including the strongest. Again this is not a whole class treatment, but has the advantage over phonics that the precise formal nature of the protocols for the related approaches of Reading Recovery and Switch-on Reading can be conducted in or out of class by teaching assistants (TAs). As with technology and other resources, merely having TAs present is not effective. But if deployed appropriately it is clear that TAs can contribute to class outcomes, and are cheaper than extra trained teachers. As discussed in relation to teachers' use of research evidence below, such evidence is most easily digested and used when engineered into a simple observable protocol like this that appears to work, and which teachers and TAs can follow.

Different approaches to improving literacy may have similar 'effects' in terms of size (see below) but in somewhat different tests of literacy. For example, a phonics approach will tend to improve word sounding more than fluency, decoding or spelling.

Table 2 - Quality and impact summary: studies of Reading Recovery/Switch-On

	Effective	Ineffective/unknown
Higher quality	1	0
Lower quality	1	1
Minimal quality	4	1

Accelerated Reader

The evidence is almost as secure for Accelerated Reader, which can be used as a whole class intervention or with individuals and small groups of struggling readers. Again the benefits are relatively small, but the overall evidence including that from the two strongest evaluations is that it works, especially for the lowest attainers (Table 3).

Table 3 - Quality and impact summary: studies of Accelerated Reader

	Effective	Ineffective
Higher quality	2	0
Medium quality	0	0
Lower quality	12	6

There must be a larger number of specific interventions in literacy and in other subject areas that could be deployed as evidence-informed, and could be implemented with the help of TAs (but which the scoping review has not picked up or which have not been evaluated at scale). And given that the named approaches discussed here all have a similar impact, it is very possible that the precise protocol does not matter as much as might appear.

Response to Intervention

Indeed there are some indications from other evidence that within limits it is not the precise nature of the protocol that is being effective in any of these approaches. Rather, **many coherent approaches to overcoming low attainment based on small group or individual attention or deployment of TAs are equally effective.** And (as above) each could address different aspects of low attainment. This is different to reducing class sizes. Altering class sizes within traditional limits, such as from 30 to 24, is not particularly helpful. The successful interventions of the kind being discussed here involve groups of only one to four pupils, while

the same approaches used with whole classes, even small classes, may be only weakly effective or even ineffective. Similarly **there is reasonably good evidence that within class groupings for specific activities and events can be beneficial.** The tiered approaches of Response to Intervention (RTI) are an example (Table 4). RTI or similar has been assessed in many subject areas across the primary age range. The effective elements are Tier 3 (individual or very small group) and Tier 2 (small group) work. Other than that, a wide range of suggested interventions and approaches are labelled here as RTI, because the idea is deliberately vague. It involves breaking the class down so that pupils can be given targeted and appropriate attention. The scoping review found 25 studies of which the strongest and the majority suggested that the idea has considerable promise.

Table 4 - Quality and impact summary: studies of RTI

	Effective	Ineffective/unknown
Higher quality	3	0
Medium quality	3	0
Low quality	15	4

Within class grouping

A lot of the studies in this area are focussed on the lowest attainers. There is less evidence on gifted children, and almost nothing directly focussed on average attainers. There are studies of within-class grouping. **As with grouping *into* classes, the indication is that within-class groups should be of mixed ability** (except where a short-term intervention such as those above is targeted). It is the scale and level of attention that seems to matter more than having pupils at the same level of progress. In general, **small group work is effective, although the evidence base is not large** (Table 5). Other than those addressed elsewhere the scoping review found only four studies on this, and one of the better ones found grouping to be ineffective.

Table 5 - Quality and impact summary: studies of class grouping

	Effective	Ineffective/unknown
Higher quality	2	1
Medium quality	0	0
Lower quality	1	0

Individualised instruction

A similar picture emerges from studies of individualised instruction (Table 6). There is a weak set of evidence pointing weakly towards benefits for individual attention. The scoping review

outlines a further 7 studies on this. In summary, **combining evaluations of specific interventions, more generic tiered teaching, and studies of grouping and individual attention there is a clear message that small is good**. If the resources are available, then within-class tiers or groups given suitable tasks would form part of the work of the evidence-informed primary teacher. It is not the purpose of the scoping review to suggest or promote specific commercially available products, and any examples given are only illustrations. **However, whatever small group or individual protocol is to be used must itself be evidence-informed.** As the previous section showed, there are small group and targeted interventions promoted and currently in use that do not appear to work. It is important to distinguish between approaches with no promise (and to avoid them), some promise (and test them rigorously at scale), and considerable promise (our best 'bets' at present).

Table 6 - Quality and impact summary: studies of individualised instruction

	Effective	Ineffective/unknown
Higher quality	0	0
Medium quality	1	1
Lower quality	5	0

3.2 Whole-class approaches

This section moves from interventions for individuals and small groups to whole class approaches.

Reasoning skills

In contrast to an emphasis on subject knowledge (above) and basic skills, it is possible to **emphasise the reasoning skills of pupils. There is a reasonable body of evidence now that such a focus has a small benefit for literacy and numeracy** (as well as any possible intrinsic merits). There is also **some promise from studies of the linked idea of teaching pupils strategies for meta-cognition (and self-regulation).** The scoping review describes 16 evaluations of which the majority, including all of the most robust studies, show at least small benefits for general attainment (Table 7). This has to be seen by schools as a promising, cheap, and currently evidence-informed way forward. Although several of these interventions involve a change to the layout and structure of classes, most of them are best undertaken in whole class groups with the teacher ensuring that all pupils can contribute, while passing considerable control to the pupils themselves.

Table 7 - Quality and impact summary: studies of teaching reasoning skills

	Effective	Ineffective/unknown

Higher quality	3	0
Medium quality	0	1
Lower quality	10	2

Maths Mastery

There is a **growing body of evidence that Singapore Maths/Maths Mastery may be effective (for maths attainment).** The overall impact (if it is an 'impact') is small. The scoping review found 7 studies of which only three are medium and higher in quality, and one of these suggests no benefit (Table 8). **Similar mastery learning approaches may be effective in other subject areas (such as science) as well but the evidence here is weaker**.

Table 8 - Quality and impact summary: studies of Singapore Maths/Maths Mastery

	Effective	Ineffective/unknown
Higher quality	1	0
Medium quality	1	1
Lower quality	3	0

4. Approaches currently untested or with mixed evidence

There are many approaches that offer some promise but either have not been robustly tested at an appropriate scale, or where they have been tested the aggregated results are mixed. The first four summaries address evidence specifically related to literacy, science, maths and arts (including music), other than studies (such as feedback) that might have been successful in any one of these areas, but where the subject area is not intrinsic to the approach. What links the studies in these four summaries is that even though a few have shown promise, they are stand-alone without replication.

Interventions to improve literacy

Where there are a number of studies on a specific approach, such as for Accelerated Reader or READ180, these have their own summaries. Other than these, and the very poor studies mentioned in the first section, the scoping review came across a relatively large number of one-off lower quality studies purporting to test a specific approach to improving literacy outcomes (Table 9). One study of poor quality or small scale cannot be anything like definitive. The scoping review describes a total of **seven medium or higher quality evaluations, only a few of which address the same specific approach.** These include Project CRISS, and Writing Wings. **None are found to be effective.** There is **one robust study suggesting that teaching young children more about formal grammar has a small benefit for later tests of literacy**, and this might be worth pursuing.

Table 9 - Quality and impact summary: approaches to improve literacy

	Effective	Ineffective/unknown
Higher quality	1	0
Medium quality	4	2
Lower quality	23	4

Interventions to improve science

As with literacy, so also with measures to improve science (Table 10). Other than more general approaches applied to science and covered elsewhere in this overview, the safest evidence comes from a study of the use of school gardens for biology which does not provide general evidence about pedagogy. Otherwise, **the picture is very mixed. Four of the studies looked at inquiry approaches and showed no benefit.**

Table 10 - Quality and impact summary: studies of improving science

	Effective	Ineffective/unknown
Higher quality	1	0

Medium quality	1	1
Lower quality	2	1

Interventions to improve maths

As with literacy (above), and other than more promising approaches covered separately, such as Maths Mastery, there is a large number of studies trying a range of approaches to improve maths (Table 11). **The evidence of benefit is slightly stronger, but there is still not enough weight of evidence to draw clear pedagogical implications of a general nature.** The strongest study reported an effect size of only 0.05 for maths improvement.

Table 11 - Quality and impact summary: studies of improving maths

	Effective	Ineffective/unknown
Higher quality	1	0
Medium quality	1	0
Lower quality	19	4

Arts interventions

Participation in the arts, drama and music has been used as a means of increasing attainment in core subjects and skills (Table 12). The scoping review describes 9 studies in this area, and the **balance is currently that arts interventions are not known to work**. However, given that a large number of weak or medium quality studies do suggest positive effects, it seems that more work in this area, taking into account some of the most promising avenues (e.g. music), would be justified.

Table 12 - Quality and impact summary: use of Arts to improve attainment

	Effective	Ineffective/unknown
Higher quality	0	1
Medium quality	1	0
Lower quality	5	2

4.1 Individual/small group approaches

Peer tutoring/mentoring

A similar picture emerges for **peer mentoring**. There has been considerable research on the impact of peer-tutoring and mentoring, especially cross-age mentoring, and some of it is of

higher quality. However, **the results are mixed**. It may be that peer collaborative work is less effective, and cross-age tutoring more so, but the overall picture is that the evidence is evenly divided (Table 13). The scoping review discusses 12 studies, of which some of the better ones report a benefit and some do not.

Table 13 - Quality and impact summary: studies of peer tutoring

	Effective	Ineffective/unknown
Higher quality	1	1
Medium quality	1	1
Lower quality	4	3

Behavioural interventions

Most of the studies involving behavioural interventions do not consider attainment or pupil progress as outcomes (and so are largely ignored in this review). The scoping review presents results from five trials, and again the evidence is evenly split (Table 14). **At present, behavioural, social and emotional interventions in order to improve general attainment are not indicated as promising**. They may, of course, have other advantages or work for specific individuals in a way that does not show up in larger datasets.

Table 14 - Quality and impact summary: Behavioural interventions

	Effective	Ineffective
Higher quality	0	0
Medium quality	2	2
Lower quality	1	0

4.2 Whole class approaches

Explicit teaching

Other than covered elsewhere in terms of specific subjects, the scoping review found only 4 evaluations of explicit teaching (an instructional strategy used by teachers to meet the needs of their students and engage them in unambiguous, clearly articulated teaching), of which only one was medium or higher quality (Table 15). **The evidence from this is sparse but promising, and several other interventions claimed to use explicit teaching as part of a package or other changes making it hard to decide on the causal model.** Any description of explicit

teaching also tends to be a list that includes other approaches such as prompt feedback and frequent quizzes that can (or not) be effective in their own right.

Table 15 - Quality and impact summary: explicit teaching

	Effective	Ineffective
Higher quality	1	0
Medium quality	0	0
Lower quality	2	1

Teacher knowledge

There has been considerable research on the value of teacher pedagogical and content knowledge. The aggregate result is mixed. It is **not clear that intervening to make teachers themselves know more about their subject areas, or about theories on how to teach, makes much difference to pupil attainment**. This may be because it is hard to alter teaching knowledge in a feasible way in an intervention. There is evidence from this review that teacher 'quality' is related to pupil results (Section 4), but the picture for teacher initial qualification is not so clear.

Several studies have attempted to enhance **teachers' use of research evidence directly. This does not seem to work**, and suggests that evidence-informed teaching needs a conduit that translates the research into something more practical that teachers (and support staff) can use. It is probable that this must be more than access to information, like the EEF's Teaching and Learning Toolkit (but that may be more suitable for policy-makers and school leaders than class teachers). The current evidence on what works could be built into initial teacher preparation, texts, resources, and lesson plans – these are what need to be evidence-informed. Examples appear in the next section. The scoping review discusses 20 mixed studies in this area (Table 16). On balance, these suggest that directly seeking to increase teacher knowledge, as such, may not work to improve pupil attainment.

Table 16 - Quality and impact summary: studies of teacher knowledge

	Effective	Ineffective
Higher quality	1	3
Medium quality	4	6
Lower quality	4	3

Teacher interaction

The evidence in general on the **impact of how teachers interact with pupils in classes is weak but perhaps promising** (Table 17). This includes work on teaching styles, facilitating pupil autonomy, and how teachers handle expectations of their pupils.

Table 17 - Quality and impact summary: studies of teacher interactions

	Effective	Ineffective/unknown
Higher quality	0	0
Medium quality	0	0
Lower quality	4	2

Feedback and enhancing self-regulation

The evidence for **enhanced immediate formative feedback in the classroom is still relatively weak.** Correlational evidence shows that it is clearly an approach that 'good' teachers use but it is not so clear that the approach can be easily taught to others for them to use effectively such that it translates into better pupil attainment. Enhancing feedback has the intention of assisting pupils to be self-regulated learners, and so studies of self-regulation are also included here. The scoping review presents 19 studies of mixed quality, and these are reasonably evenly split between those presenting successful outcomes and those where the intervention had no impact (Table 18).

Table 18 - Quality and impact summary: studies of feedback/self-regulation

	Effective	Ineffective/unknown
Higher quality	1	1
Medium quality	1	2
Lower quality	11	3

Mindfulness

The evidence on mindfulness interventions is sparse and weak, and the approach should probably be treated as ineffective in the same way as improving attitudes and aspirations until better studies emerge. As with all approaches there may be intrinsic or other benefits – the studies are all judged here only in terms of pupil learning and attainment. The scoping review only found two small trials with the relevant age group (Table 19).

Table 19 - Quality and impact summary: mindfulness

	Effective	Ineffective/unknown

Higher quality	0	0
Medium quality	0	0
Lower quality	2	0

Content knowledge

There is currently **very little robust work on the impact of emphasising wider content knowledge in teaching primary age children, and overall the current conclusion has to be that it is not known to be effective** in terms of attainment in maths and literacy. Emphasising cultural, historical, geographical or other knowledge may have so far unknown intrinsic or long-terms benefits however. The scoping review describes 6 relevant studies of which the most robust is of only medium quality, all of which test the "Core Knowledge curriculum" or approaches based directly, and suggests that this approach does not work (Table 20).

Table 20 - Quality and impact summary: studies of Core Knowledge

	Effective	Ineffective/unknown
Higher quality	0	0
Medium quality	0	1
Lower quality	4	1

5. Approaches currently deemed ineffective or harmful

Grade retention and ability grouping

It is reasonably clear from evidence prior to this review that **grade retention, and setting and streaming of young children so that each class includes a narrower range of ability or prior attainment** (and teaching is largely traditional and in whole classes), **are not effective**. It may even be harmful for attainment (and wider socialisation). This is very different from saying that specific interventions and activities should not be targeted at groups and individuals within mixed ability groups (see below).

Motivation and attitudes

It is also reasonably clear from previous robust reviews that **intervening to increase children's motivation to attain, their aspiration to succeed or attitudes related to education does not, in itself, improve attainment**. Attitudinal change either needs to be tied to specific behaviour changes that may then be rewarded and build towards better attainment (such as attendance in class or completion of homework), or accompanied by tuition to improve competence as well (which may then be sufficient in its own right). Motivation is more about whether any other interventions work rather than being the basis for an appropriate intervention in its own right.

Use of technology

There is now a **considerable body of evidence that simply using commercial software or replacing teacher roles with Information Technology (IT) and Computer Assisted Learning (CAL) is not effective**. There are approaches that have been successful that do involve technology (and some are described above) but it appears as though each approach works (or not) and may involve technology (or not). Simply having and using interactive boards, tablets, clickers and so on is not sufficient. The scoping review describes 35 studies using IT/CAL that are not otherwise covered elsewhere (Table 21). The better studies are clearly negative in the sense of showing no benefit (or worse) for learning. There are some studies suggesting that use of technology instead of teachers is actually harmful. The weak studies are mixed in their reported outcomes, which is unusual compared to other approaches where poor studies are well-known to report overly positive outcomes.

Table 21 - Quality and impact summary: studies of ICT/CAL

	Effective	Ineffective/unknown
Higher quality	0	3
Medium quality	1	3
Lower quality	19	9

READ180

There are a small number of specific interventions that have been trialled more than once with no obvious benefit for outcomes, including READ180 (Table 22). This shows that READ180 does not work, with the bulk of evidence including the most powerful studies showing no benefit.

Table 22 - Quality and impact summary: READ180

	Effective	Ineffective/unknown
Higher quality	0	2
Medium quality	1	0
Lower quality	1	3

6. Conclusion

We can only provide summary evidence here for the approaches that been evaluated, and there may be many more that have not been. There are interesting questions raised by the pattern of approaches with evidence of effectiveness - whether it is about structured (evidence-informed) protocols where evidence most easily informs teaching, or teachers organising lessons to provide opportunities for pupils to reason and debate. Perhaps then this is less about making less effective teachers behave like the more successful ones, but more about being able to provide structures and successful protocols for the less effective ones. This would have to be investigated further.